PATENT SPECIFICATION

733,338

Date of filing Complete Specification (under Section 3 (3) of the Patents Act, 1949): Feb. 12, 1953.

Application Date: Nov. 12, 1953. No. 23841/51.
Application Date: Jan. 17, 1952. No. 1381/52.
Application Date: Feb. 13, 1952. No. 3789/52.

Complete Specification Published: July 13, 1955.

Index at acceptance:—Classes 78(1), A1H3; and 140, A1A, A2(D:F:X).

COMPLETE SPECIFICATION

Improvements in or relating to Belts Suitable for Conveyors

We, JOHN LEWIS, a British subject, and RUBBER IMPROVEMENT LIMITED, a Company registered under the laws of Great Britain, both Leonex Works, Hythe Road, Willesden, N.W.10, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to belts suitable for conveyors and more especially to belts made from a tough, flexible, thermoplastic material substance.

One type of belt consists of a fabric interlayer or layers in a matrix of thermoplastic material. Thus one or more fabric interlayers coated or separated by thermoplastic material are contained between outer covers made of thermoplastic material.

The invention consists of a method of making belts of thermoplastic material for conveyors in which the component parts, comprising a fabric interlayer or layers and thermoplastic covers, or two or more fabric interlayers with a thermoplastic layer between, with or without thermoplastic covers, are assembled and secured together to form a handlable carcass and are then passed to a suitable machine for fusion of the thermoplastic material.

Conveniently, the interlayer or layers and covers, or the layers only, are secured together by means of threads of any type of textile material. The threads could be of the same thermoplastic material as the belt. One method of securing is by rows of stitching in the longitudinal or transverse direction of the belt. Another method is by inserting the thread through holes in the belt carcass and tying.

An alternative method of securing is by spot welding of the thermoplastic material of the carcass by direct or induction heating.

It is to be understood that the method is not limited to the specific type of belt mentioned and that the method refers to any belt consisting of a matrix of thermoplastic material with interlayers of textile and non-textile materials of synthetic or of natural origin such as metal, plastic materials, cotton, glass, or asbestos in the form of fibres, laminae or interlocking or other shapes.

The interlayer material may consist of wire incorporated into a woven fabric of textile material. The wire may be twisted, stranded, or hollow and may be hardened, plated or processed in any suitable way. The textile fibres suitable for the textile material include cotton, wool, nylon and rayon, which may be incorporated in any convenient form of weave.

Alternatively, the interlayer of the belt may be formed wholly or in part of cables consisting of a centre core, e.g. of wire or rope twisted or otherwise and a cover of thermoplastic material.

The centre core of the cables could conveniently be of wire, hollow or stranded, which may or may not be hardened, plated or processed in any other way.

The centre core of the cables may conveniently be coated or covered by dipping, electrical deposition or extrusion or any other suitable method.

When the wire has been coated to form the cables, these would then be woven into an interlayer which would then be incorporated in the carcass.

The cables could run either longitudinally or laterally and may be interspaced at intervals by tubular thermoplastic material without a centre core.

The woven interlayer may consist of twisted metal wire covered by polyvinyl chloride, the strands running in a longitudinal direction and being woven into a fabric with tubular thermoplastic material running laterally across the carcass.

Suitable thermoplastic substances for the matrix are those of the vinyl, vinylidene, vinyl-formal, vinyl-butyral, vinyl alcohol, ethylene, amide or sulphide polymers, as well as thermoplastic chemical derivatives of lignin and cellulose.

[Pric

Price

Price 4-

A preferred thermoplastic material is polyvinyl chloride.

The matrix layer material and/or covers may be calendered or extruded sheet or may be obtained by spreading a thermoplastic dough or paste on one or both faces of the interlayer material. If desired the coated interlayer could then be subjected to a preliminary fusing operation.

The structure of the belting is of plies of any one or more of the aforementioned interlayer materials alternating with layers of one or more of the aforementioned matrix-layer materials, the outer layers being usually, though not exclusively, made of the same material as the matrix layers and usually thicker than the interlayers and the matrix layers inside.

The final fusion or any intermediate operations can be effected by any of the known methods, for example, by continuously operating fusion machines, and by heat conveyed by contact, radiation or high frequency transfer.

The centre part may be assembled and fused with a top and bottom cover leading the edges of the carcass part exposed and the edges of the carcass part are then covered in a separate operation.

The edges of the carcass part may be covered by a mechanical operation on the projecting edges of one or both covers during the fusion operation, or by coating with a plastic dough or paste which is subsequently fused, or by securing over the edges and to the top and bottom cover an extruded or calendered edge strip of the thermoplastic material which is subsequently fused.

The dough on the edges may be applied before the main fusion operation for the belt, in which case it is fused in the main fusing operation, or afterwards, in which case the dough is fused by a further fusing operation.

In the case where projecting edges of one or both covers are turned over the edge of the carcass by a mechanical operation during the main fusing operation, the covers may be cut to leave projecting edges on one or both covers to be turned over or suitable projecting edges may be stitched on subsequently.

The edge or edges may be turned over by a suitable plough arrangement, in the case where a continuous machine is used, and may join up edge-on or in overlapping relation.

Stitched on cover edges may be of the same thickness as, or different thickness to, the covers.

In the case where an edge grip is secured over the edges of the carcass and to the top and bottom cover, it may be secured by stitching or tying with threads of thermoplastic material or by spot welding of the thermoplastic material by direct or induction heating.

In the case where the plastic dough is used this may be brushed, sprayed or spread on the edges of the belt carcass.

It will be understood that combinations of the above methods may be used.

An embodiment of the invention will be described with reference to the accompanying drawings.

Figure 1 is a diagrammatic view of a machine for coating the fabric interlayers.

Figure 2 is a diagrammatic view of the assembling arrangement.

Figure 3 is a diagrammatic view of an edge moulding arrangement.

Figure 4 is a section through the thermoplastic channel used for edge-moulding.

The layers of fabric 1 are separately coated with the polyvinyl chloride and/or any of the other stated thermoplastic materials and passed through a chamber or machine 2 having sufficient heat to satisfactorily fuse such thermoplastic material and make it adhere to the fabric (Figure 1) and containing infra-red lamps 3 above the layer to be fused and a steam plate 4 below it.

The separate layers or plies of fabric 1 having the fused layer of thermoplastic material on each side of each layer, are then superimposed on each other and drawn along a table 5 in correct alignment and passed between two sets of tensioning rollers 6 (Figure 2).

At a point between the two sets of tensioning rollers a series of heavy duty sewing machines (not shown) sew the superimposed plies longitudinally into a handlable carcass 8 prior to passage to the fusion machine. The points at which the sewing machine act are indicated by the reference arrows 7.

The cover stock of calendered or extruded thermoplastic material is applied to the above carcass prior to entry into the fusion machine.

The belt, after fusion, is passed through trimming knives, and trimmed to width, thus leaving cut edges, which require sealing before the belt can be regarded as complete and the preferred method of performing this operation is as follows:—

The belt 8 having been cut to width, i.e. removed to an edging mould (Figure 3) and the edging of the belt carried out in lengths as under.

The cut edges of the belt are coated with thermoplastic dough as they pass over the plate 9 and extruded channel strip 10 of thermoplastic material (Figure 4) is affixed to the length to be edged. This length is drawn into the edging moulds 11 which are steam heated and the extruded channel fused to the belt, under vertical pressure from the compressed air pistons 12 and lateral pressure from the screw 13. After fusion the length is cooled by passing water through the moulds 11 before removal from the mould portion of the edging machine.

Various modifications may be made within

the scope of the invention.

What we claim is:—

1. A method of making belts of thermoplastic material for conveyors in which the component parts, comprising a fabric interlayer or layers and thermoplastic covers, or two or more fabric interlayers with a thermoplastic layer between, with or without thermoplastic covers, are assembled and secured together to form a handlable carcass and are then passed to a suitable machine for fusion of the thermoplastic material.

2. A method as claimed in Claim 1, in which the interlayer or layers and covers or the interlayers only, are secured together by means of threads.

3. A method as claimed in Claim 2, in which the thread is made of the same thermoplastic material as the belt, or is of any type of textile material.

4. A method as claimed in Claim 2 or 3, in which the securing is effected by means of stitching in the longitudinal or transverse direction of the belt.

5. A method as claimed in Claim 3, in which the securing is effected by inserting the thread through holes in the belt carcass and tying.

6. A method as claimed in Claim 1 in which the securing is effected by spot welding of the thermoplastic material of the carcass by indirect or induction heating.

7. A method as claimed in any of the preceding claims in which the carcass provided with top and bottom covers is assembled leaving the edges of the carcass part exposed.

8. A method as claimed in Claim 7, in which the edges of the carcass are covered by a mechanical operation during the fusing of the carcass.

9. A method as claimed in Claim 7, in which the edges of the carcass are covered by coating with a plastic dough which is subsequently fused.

10. A method as claimed in Claim 7, in which an extruded or calendered edge strip is secured over the edges and to the top and bottom cover and subsequently fused.

11. A belt for conveyors when prepared by the method claimed in any of the preceding claims, and comprising a matrix of thermoplastic material with interlayers of textile or non-textile materials of synthetic or of natural origin such as metal, plastic materials, cotton, glass, asbestos, in the form of fibres, laminae or interlocking or other shapes.

12. A belt as claimed in Claim 11, in which the interlayer material consists of wire incorporated into a woven fabric of textile material.

13. A belt as claimed in Claim 11, in which the interlayer is formed wholly or in part of cables consisting of a centre core of wire or rope twisted or otherwise and a cover of thermoplastic material.

14. A belt as claimed in Claim 12 or 13, in which the wire is twisted, stranded or hollow and hardened, plated or processed in any suitable way.

15. A belt as claimed in Claim 11, in which the thermoplastic material is polyvinyl chloride.

MARKS & CLERK.

PROVISIONAL SPECIFICATION
No. 23841 A.D. 1951

Improvements in or relating to Belts Suitable for Conveyors

We, JOHN LEWIS, a British subject, and RUBBER IMPROVEMENT LIMITED, a Company registered under the laws of Great Britain, both Leonex Works, Hythe Road, Willesden, London, N.W.10, do hereby declare this invention to be described in the following statement:—

This invention relates to belts for conveyors and the like and more especially to a tough, flexible, thermoplastic material comprising a thermoplastic macromolecular substance.

The invention consists of a method of making belts of thermoplastic material of the kind mentioned for conveyors and the like in which the component parts are assembled and secured together to form a handlable carcass prior to passage to a suitable machine for fusion of the thermoplastic material.

One type of belt consists of fabric layers in a matrix of thermoplastic material. Thus one or more fabric layers are contained between outer covers; in the case of more than one fabric layer, adjacent layers being separate by thermoplastic material.

Further, according to the invention, the fabric layer or layers and covers or two or more fabric layers, are secured together to form a handlable carcass prior to passage to a suitable machine for fusion.

Preferably, the layer or layers and cover or the layers only, are secured together by means of thread of thermoplastic material.

Conveniently, the thread could be of the same material as the matrix.

One method of securing is by rows of stitching in the longitudinal or transverse direction of the belt.

Another method is by inserting the thread through holes in the belt carcass and tying.

An alternative method of securing is by spot welding by direct or induction heating.

It is to be understood that the method is

not limited to the specific type of belt mentioned and that the method refers to any belt consisting of a matrix with interlayers of textile and non-textile materials in the form of fibres, laminae or interlocking or other shapes and consisting of metal, of plastic materials, of cotton, of glass or of asbestos and the like, of synthetic or of natural origin.

The structure of the belting is of piles of any one or more of the aforementioned interlayer materials alternating with layers of one or more of the aforementioned matrix-layer materials, the outer layers being usually, though not exclusively, matrix layers and usually thicker than the interlayers and the layers inside.

Suitable thermoplastic substances are those of the vinyl, vinylidene, vinyl-formal, vinyl-butyral, vinyl alcohol, ethylene, amide or sulphide polymers type, as well as lignin and cellulose materials and their chemical derivatives.

A preferred thermoplastic material is polyvinyl chloride.

The layer material and/or covers may be calendered or extruded sheet or may be obtained by spreading a thermoplastic dough or paste spread on one or both faces of the interlayer material. If desired the coated interlayer could then be separately fused.

The final fusion or any intermediate operations can be effected by any of the known methods, for example, in continuously operating fusion machines, and by heat conveyed by contact, radiation or high frequency transfer.

The invention further consists of a method of making belts of thermoplastic material of the kind mentioned for conveyors or the like, in which the centre part and a top and bottom cover are assembled prior to fusion, leaving the edges of the centre part exposed and the edges of the centre part are covered in a separate operation.

The edges of the centre part may be covered by a mechanical operation on projecting edges of one or both covers during the fusion operation, or by coating with a plastic dough or paste which is subsequently fused, or by securing over the edges and to the top and bottom cover an extruded or calendered edge strip of the thermoplastic material which is subsequently fused.

The dough may be applied before the main fusion operation for the belt, in which case it is fused in the main fusing operation, or afterwards, in which case the dough is fused by a further fusing operation.

In the case where projecting edges of one or both covers are turned over the edge of the centre part by a mechanical operation during the fusing operation, the covers may be cut to leave projecting edges on one or both covers to be turned over or suitable projecting edges may be stitched on subsequently.

The edge or edges may be turned over by a suitable plough arrangement, in the case where a continuous machine is used, and may join up edge-on or in overlapping relation.

Stitched on cover edges may be of the same thickness as, or different thickness to, the covers.

In the case where an edge strip is secured over the edges of the centre part and to the top and bottom cover, it may be secured by stitching or tieing with threads of thermoplastic material or by spot welding by direct or induction heating.

In the case where plastic dough is used this may be brushed, sprayed or spread on the edges of the belt carcass.

It will be understood that combinations of the above methods may be used.

Various other modifications may be made within the scope of the invention.

MARKS & CLERK.

PROVISIONAL SPECIFICATION

No. 1381 A.D. 1952

Improvements in or relating to Belts, Suitable for Conveyors or for the Transmission of Power

We, JOHN LEWIS, a British subject, of the Company's address and RUBBER IMPROVEMENT LIMITED, a British Company, of Leonex Works, Hythe Road, Willesden, London, N.W.10, do hereby declare this invention to be described in the following statement:—

This invention relates to belts for conveyors and the like, or for the transmission of power and more especially to belts made from a tough, flexible, thermoplastic material comprising a thermoplastic macromolecular substance.

The invention consists of a belt in which the body of the belt is formed wholly or in part of filaments consisting of a centre core of metal, wire, rod, rope or the like twisted or otherwise and a cover of thermoplastic material.

The filaments are conveniently coated or covered by dipping, electrical deposition or extrusion or any other suitable method.

As an example the filament core could conveniently be of wire, tubular or stranded, which may or may not be hardened, plated or processed in any other way.

When the wire has been coated to form the

filaments, these would then be woven into a matrix which would form the body of the belt.

The filaments could run either longitudinal or laterally and may be interspaced at intervals by solid tubular thermoplastic material without a centre core.

For example, the woven carcass may consist of twisted metal wire covered by P.V.C. the strands running in a longitudinal direction and being woven into a fabric with a solid tubular thermoplastic material running laterally across the carcass.

The coated filaments can also be woven into a fabric using any textile material such as cotton, wool, nylon, rayon and using any form of weave.

The body of the belt may be completed by any known method of belting production.

Thus, the body may have outer covers consisting of a layer of fabric on either side either proofed or unproofed and solid covers in sheet form could then be applied if so desired. Sheets of thermoplastic material could be applied on either side and the final fusion or any intermediate operations can be effected by any of the methods known, for example, in continuously operating fusion machines and by heat conveyed by contacts, radiation or high frequency transfer.

Various modifications may be made within the scope of the invention.

MARKS & CLERK.

PROVISIONAL SPECIFICATION

No. 3789 A.D. 1952

Improvements in or relating to Belts Suitable for Conveyors

We, JOHN LEWIS, a British subject, of the Company's address and RUBBER IMPROVEMENTS LIMITED, a British firm, of Leonex Works, Hythe Road, Willesden, London, N.W.10, do hereby declare this invention to be described in the following statement:—

This invention relates to belts for conveyors and the like or for the transmission of power.

In our application No. 23841/51 we have described a method of making belts of thermoplastic material. An extension of this method is described in our application No. 27688/51.

In our first mentioned application reference was made to any belt consisting of a matrix with interlayers of textile and non-textile materials in the form of fibres, laminae or interlocking or other shapes and consisting of metal, of plastic materials, of cotton, of glass or of asbestos and the like, of synthetic or of natural origin.

The present invention relates to a similar type of belt to that described in those applications in which the core or carcass consists of wire incorporated into a woven fabric of textile material.

The wire may, for example, be twisted, stranded, or tubular wire and may be hardened, plated, or processed in any suitable way. It is conveniently woven into the fabric.

Textile fibres suitable for the textile rayon.

Any convenient form of weave may be used.

Subsequently the core or carcass would have a thermoplastic material applied thereto, e.g. in one of the ways described in our previous applications mentioned.

Various modifications may be made within the scope of the invention.

MARKS & CLERK.

Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press.—1955.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

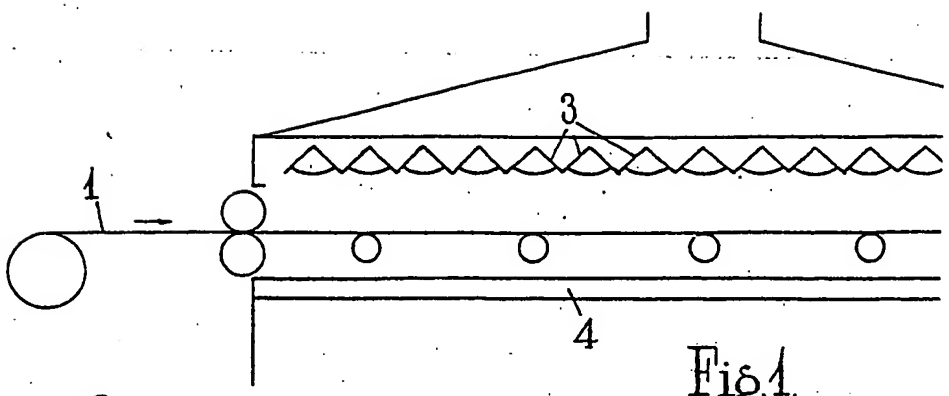
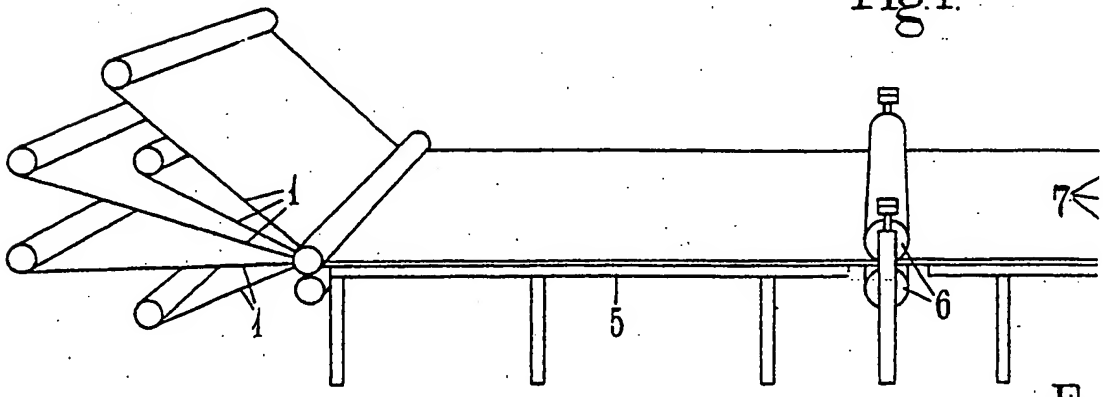


Fig.1.



Fi

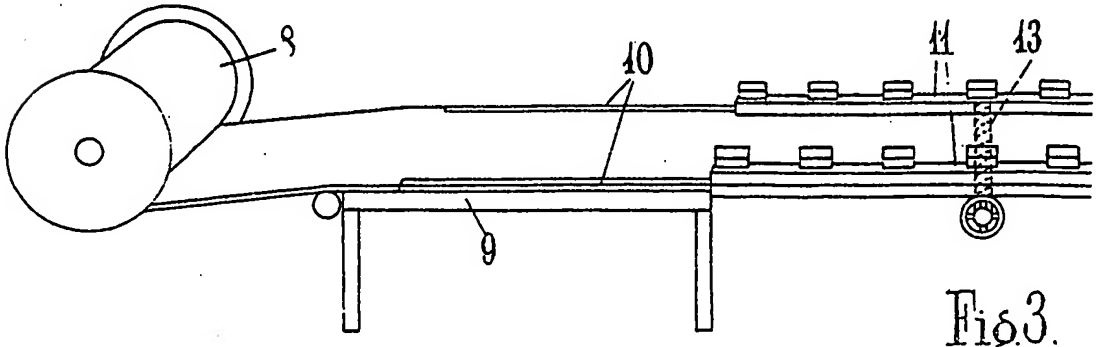


Fig.3.

733,338 COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

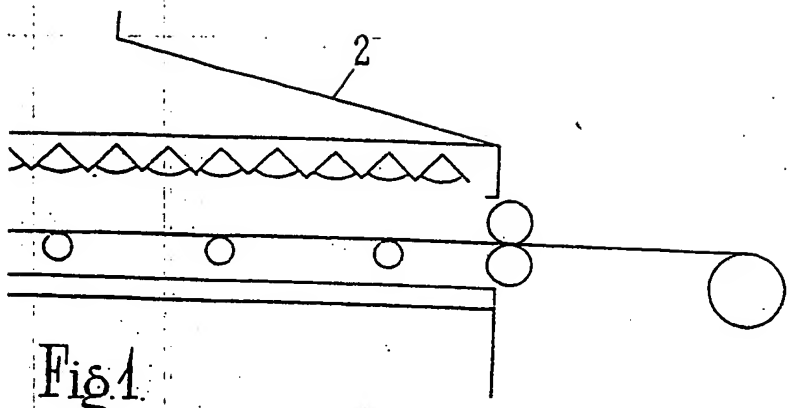


Fig.1.

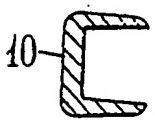


Fig.4.

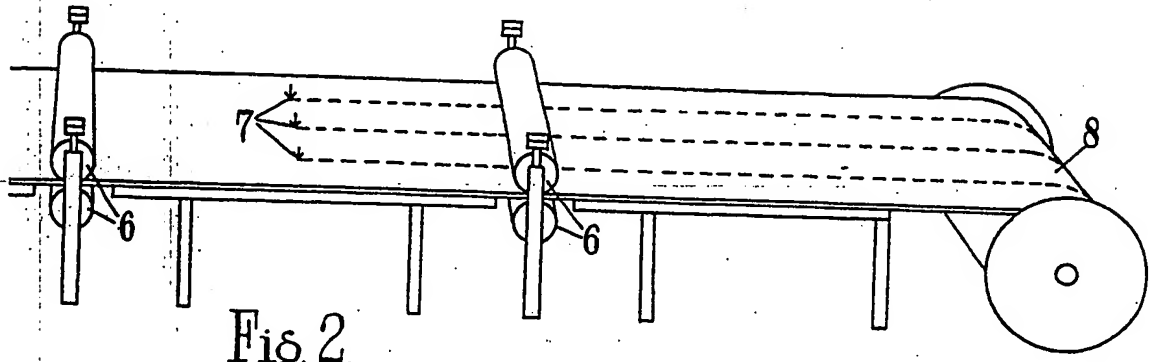


Fig.2.

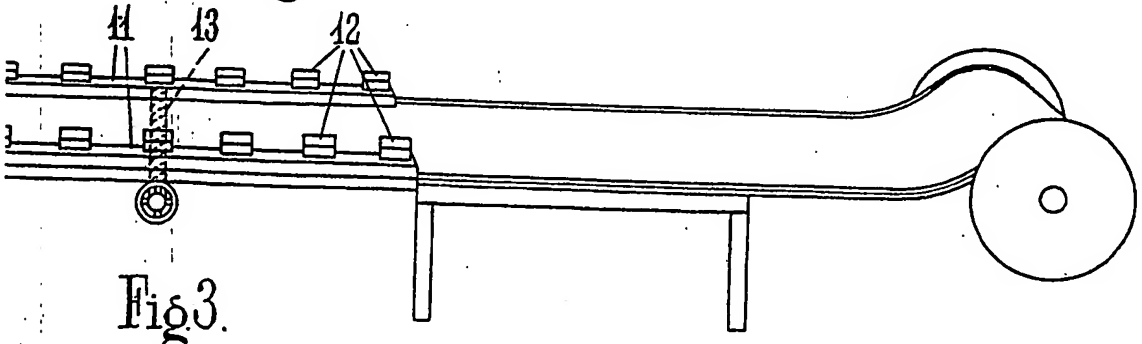


Fig.3.

733,338 COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

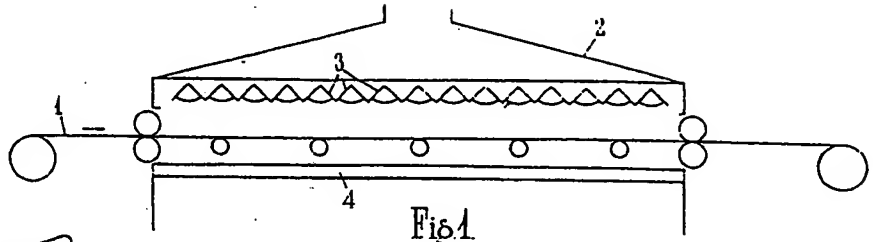


Fig.1.

Fig.4.

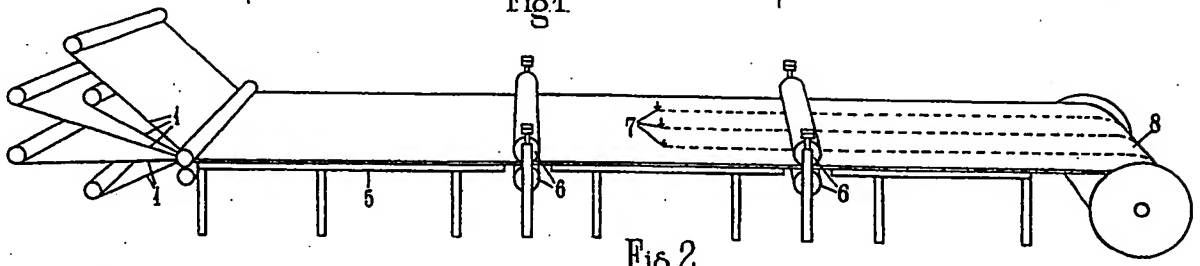


Fig.2.

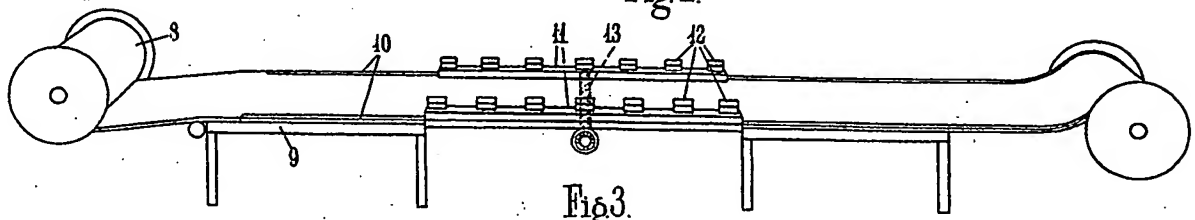


Fig.3.